

WHAT IS CLAIMED IS

1. In a structure of electrical connection between two or more superconducting lines, a superconducting line connection structure characterized by the presence of superconductor powder including magnesium diboride provided between said superconducting lines.
2. A superconducting line connection structure according to Claim 1, characterized by using a mixture of superconducting powder and metal powder between said superconducting lines as an alternative to said superconducting powder, wherein metallic powder or alloy powder having a melting point lower than said superconducting powder is added to said mixture of superconducting powder and metal powder.
3. A superconducting line connection structure according to Claim 1 or 2, characterized in that the average particle size of said superconducting powder is 20 microns or less.
4. A superconducting line connection structure according to Claim 1 or 2, characterized in that said superconducting line and said mixture of superconducting powder and metal powder are enclosed

in a coating material made of a pure metal of gold,  
silver, copper, platinum, palladium, aluminum, niobium,  
lead, tin, magnesium, indium, tungsten, cobalt, nickel,  
iron, tantalum or chromium, or an alloy containing at  
5 least one of said metals.

5. A superconducting line connection structure  
according to Claim 1 or 2, characterized in that a  
superconducting filament enclosed in said  
10 superconducting line is directly in contact with said  
superconducting powder at least on some portion of the  
contact surface between said superconducting line and  
said superconducting powder.

15 6. A superconducting line connection structure  
according to Claim 1 or 2, characterized in that the  
density of said superconducting powder is 50 % or more  
of theoretical density.

20 7. A method for producing a superconducting line  
connection structure according to Claim 1 or 2,  
characterized in that heat treatment of said  
superconducting line connection structure is not  
effected.

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8. A method for producing a superconducting line connection structure according to Claim 1 or 2, characterized in that heating is performed to reach the temperature equal to or higher than the range  
5 where a part of any one of (1) said superconducting line, (2) said superconducting powder and (3) said pure metal powder or said alloy powder included in said mixture of superconducting powder and metal powder melts down.

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9. A method for producing a superconducting line connection structure according to Claim 4, comprising;

(1) a first step of enclosing said superconducting line and said superconducting powder in a coating  
15 material made of a pure metal of gold, silver, copper, platinum, palladium, aluminum, niobium, lead, tin, magnesium, indium, tungsten, cobalt, nickel, iron, tantalum or chromium, or an alloy containing at least one of said metals, and

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(2) a second step of deforming the portion produced in the first step by applying a pressure of 1 ton/cm<sup>2</sup> or more thereto.

10. A superconducting line connection structure  
25 according to Claim 1 or 2, characterized in that at least one of said multiple superconducting lines to be

connected or said multiple superconducting stranded wires has the critical temperature equal to or higher than that of magnesium diboride.

5 11. A superconducting line connection structure according to Claim 1 or 2, characterized in that the superconducting line to be connected is a superconducting stranded wire formed by twisting multiple superconducting lines.

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12. A superconducting line connection structure according to Claim 11, characterized in that said superconducting stranded wire is a superconducting stranded wire inside a cable-in-conduit type forcibly cooled superconductor.

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13. A superconducting magnet apparatus characterized by comprising a superconducting line connection structure according to Claim 1 or 2.

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14. A superconducting magnet apparatus characterized by comprising a superconducting line connection structure manufactured in the method for producing a superconducting line connection structure according to Claim 7.

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15. A superconducting line comprising a  
superconducting line connection structure according to  
Claim 1 or 2.

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